Developmental Biology 331 (2009) 385–387

Contents lists available at ScienceDirect

Developmental Biology

journal homepage: www.elsevier.com/developmentalbiology

Abstracts

Concurrent session 1: Germ and embryonic stem cells

Program/Abstract # 3
Asymmetric stem cell division ensured by anaphase spindle repositioning
Yukiko M. Yamashita[a], Hebao Yuan[a], Jun Cheng[b], Alan J. Hunt[b]
[a]*Life Sciences Institute, Center for Stem Cell Biology, USA*
[b]*Department of Biomedical Engineering, Center for Ultrafast Optical Science, USA*

Many stem cells divide asymmetrically to balance self-renewal and differentiation. In *Drosophila* testes, two stem cell populations, germline stem cells (GSCs) and somatic cyst stem cells (CySCs, or historically called cyst progenitor cells), cohere and regulate one another. CySCs not only generate cyst cells (CCs) that support differentiating germ cells, but also encapsulate GSCs to maintain GSC identity. Therefore, the balance between CySC self-renewal and differentiation must be tightly controlled to maintain the corresponding balance of GSCs and sustain spermatogenesis. Here, we report that CySCs divide asymmetrically through spindle repositioning in anaphase. This is in striking contrast to their neighbor GSCs, whose spindle is rigidly oriented toward the niche throughout mitosis. CySC spindle repositioning in anaphase requires functional centrosomes and the actin-associated membrane protein, Moesin. We demonstrate that anaphase spindle repositioning is required to achieve high-fidelity asymmetric divisions in CySCs, thus maintaining both GSC and CySC numbers. We propose that dynamic spindle repositioning allows CySCs to divide asymmetrically while accommodating encapsulated GSCs.

doi:10.1016/j.ydbio.2009.05.008

Program/Abstract # 4
A travelling niche: Steel factor controls primordial germ cell survival and motility throughout their migration
Ying Gu[a,b], Chris Runyan[a], Amanda Shoemaker[a], Azim Surani[c], Chris Wylie[a]
[a]*Div. of Dev. Biol., Cincinnati Children's Hospital Research Foundation, Cincinnati, OH, USA*
[b]*Graduate Program in Mol. and Dev. Biol., Univ. of Cincinnati, Cincinnati, OH, USA*
[c]*Gurdon Institute, Univ. of Cambridge, Cambridge, UK*

Primordial germ cells (PGCs) are the embryonic founders of adult gametes. In mouse, they arise around E7.25, and migrate through different tissues in an embryo which is undergoing rapid growth and organogenesis, to colonize the genital ridges by E11.5. How are PGC behaviors, including proliferation, survival, motility and homing, controlled in a rapidly changing environment? By studying the expression pattern and functions of Steel factor, we propose a mechanism in which the expression of essential signals accompanies the migrating PGCs in a kind of “travelling niche”, to regulate PGC behaviors. We show first that PGCs are surrounded by Steel factor-expressing cells from their first appearance in the allantois to the time they enter the genital ridges. Second, fewer PGCs are found in the allantois in *Steel*-null embryos, but this is not due to a failure of PGC specification. Third, the analysis of cultured *Steel*-null early embryos shows that Steel factor is required for normal PGC motility, both in the allantois and in the hindgut. Altogether, our data show that PGCs are Steel factor dependent throughout their migration, and suggest the existence of a “traveling niche” in which the Steel factor-expressing cells provide a spatio-temporal environment along the migratory route to retain the normal properties of this important pluripotential cell population.

(Funding Source: Cincinnati Children's Hospital Research Foundation)

doi:10.1016/j.ydbio.2009.05.009

Program/Abstract # 5
Specifying root/shoot stem cells during *Arabidopsis* embryogenesis
Jeff A. Long
Plant Biology Laboratory, Salk Institute for Biological Studies, La Jolla, CA, USA

In both animals and plants, the formation of a polaraxis is one of the first steps during embryogenesis. Cell fate must then be specified and maintained along thisaxis in order for proper development to occur. In plants, a basic body plan is set up during embryogenesis, with a shoot pole at the apical half and a root pole at the basal half. We have identified a mutation in the *Arabidopsis TOPLESS* gene (*tpl-1*) that displays a transformation of the apical half of the embryo into a second basal half, resulting in embryos with two root poles. The TPL protein shows structural similarity to known co-repressors and is hypothesized to repress root genes in the shoot half of the embryo. Using the *tpl-1* allele as a tool, we have now identified two classes of transcription factors that either specify the shoot or the root during embryogenesis. Through misexpression studies and genetic analysis, we can now control the identity of either the shoot or the root pole. I will present data on how these transcription